ICPLM611

DESCRIPTION

The ICPLM611 consists of a high efficient AlGaAs light emitting diode and a high speed optical detector. This unique design provides maximum AC and DC circuit isolation while achieving LVTTL/LVCMOS compatibility. The output of the optical detector features an open collector Schottky clamped transistor.

The internal shield provides a guaranteed common mode transient immunity specification of 10 KV/us at 3.3V/5V operation.

The device is in half pitch mini flat 5 pin package.

FEATURES

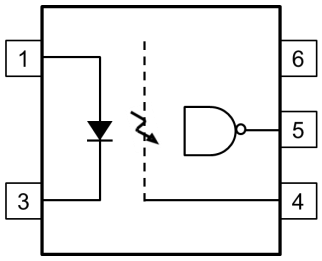
- 3.3V/ 5V Dual Supply Voltages
- Half Pitch 1.27mm
- High Speed 10Mbit/s Typical
- LVTTL / LVCMOS Compatible
- Low Input Current Capability 5mA
- Guaranteed Performance from −40°C to 85°C
- Minimum Common Mode Transient Immunity 10kV/µs at V_{CM} 1000V
- High AC Isolation Voltage 3750V_{RMS}
- RoHS Compliant
- UL Approval E91231

APPLICATIONS

- Line Receivers
- Data Communication
- High Speed Logic Ground Isolation
- Pulse Transformer Replacement
- Switch Mode Power Supplies
- Ground Loop Elimination
- Computer Peripheral Interface

ORDER INFORMATION

- Supplied in Tape and Reel



1 Anode
3 Cathode
4 GND
5 V_O
6 V_{CC}

A 0.1µF bypass Capacitor must be connected between Pins 6 and 4.

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Stresses exceeding the absolute maximum ratings can cause permanent damage to the device.
Exposure to absolute maximum ratings for long periods of time can adversely affect reliability.

Input	
Forward Current	20mA
Peak Forward Current Pulse Width ≤ 50ns, Average Current ≤ 20mA	50mA
Reverse Voltage	5V
Power dissipation	40mW
Output	
Output Current	50mA
Output Voltage	7V
Supply Voltage	7V
Power Dissipation	85mW
Total Package	
Isolation Voltage	3750V_{RMS}
Operating Temperature	−40 to 85°C
Storage Temperature	−40 to 125 °C
Lead Soldering Temperature (10s)	260°C

ISOCOM COMPONENTS 2004 LTD
Unit 25B, Park View Road West, Park View Industrial Estate
Hartlepool, Cleveland, TS25 1PE, United Kingdom
Tel : +44 (0)1429 863 609 Fax : +44 (0)1429 863 581
e-mail : sales@isocom.co.uk
http://www.isocom.com

ISOCOM COMPONENTS ASIA LTD
Hong Kong Office
Block A, 8/F, Wah Hing Industrial Mansions
36 Tai Yau Street, San Po Kong, Kowloon, Hong Kong
Tel : +852 2995 9217 Fax : +852 8161 6292
e-mail : sales@isocom.com.hk

Truth Table

LED	Output
ON	L
OFF	H

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Operating Temperature	T_A	−40	85	°C
Supply Voltage	V_{CC}	2.7	3.6	V
		4.5	5.5	
Input Current, High Level	I_{FH}	5	15	mA
Input Current, Low Level	I_{FL}	0	250	µA
Output Pull-up Resistance	R_L	330	4k	Ω
Fan Out (R_L = 1kΩ per channel)	N		5	TTL Loads

ELECTRICAL CHARACTERISTICS (T_A = −40 to 85°C, 2.7V ≤ V_{CC} ≤ 3.6V, I_F = 7.5mA unless otherwise specified)

INPUT

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Forward Voltage	V_F	I_F = 10mA, T_A = 25°C		1.38	1.80	V
Forward Voltage Temperature Coefficient	$\Delta V_F/\Delta T$	I_F = 10mA		−1.6		mV/°C
Reverse Voltage	V_R	I_R = 10µA	5.0			V
Input Capacitance	C_{IN}	V_F = 0V, f = 1MHz		34		pF

OUTPUT

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
High Level Supply Current	I_{CCH}	I_F = 0mA, V_{CC} = 3.3V		3.8	7	mA
Low Level Supply Current	I_{CCL}	I_F = 10mA, V_{CC} = 3.3V		5.8	10	mA
High Level Output Current	I_{OH}	I_F = 250µA V_{CC} = V_O = 3.3V		5	100	µA
Low Level Output Voltage	V_{OL}	I_F = 5mA, V_{CC} = 3.3V, I_{OL} = 13mA		0.3	0.6	V

COUPLED

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Input Threshold Current	I_{TH}	V_{CC} = 3.3V, V_O = 0.6V I_{OL} = 13mA		1.5	5	mA

SWITCHING

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Propagation Delay Time to High Output Level	t_{PLH}	R_L = 350Ω C_L = 15pF		60	90	ns
Propagation Delay Time to Low Output Level	t_{PHL}			25	75	
Pulse Width Distortion	$\lvert t_{PHL} - t_{PLH} \rvert$			35	45	
Propagation Delay Skew	t_{PSK}				40	
Output Rise Time (10% to 90%)	t_r			27		
Output Fall Time (90% to 10%)	t_f			7		

* Typical values at T_A = 25°C, V_{CC} = 3.3V

ELECTRICAL CHARACTERISTICS (T_A = −40 to 85°C, 4.5V ≤ V_{CC} ≤ 5.5V, I_F = 7.5mA unless otherwise specified)

INPUT

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Forward Voltage	V_F	I_F = 10mA, T_A = 25°C		1.38	1.80	V
Forward Voltage Temperature Coefficient	$\Delta V_F/\Delta T$	I_F = 10mA		−1.6		mV/°C
Reverse Voltage	V_R	I_R = 10µA	5.0			V
Input Capacitance	C_{IN}	V_F = 0V, f = 1MHz		34		pF

OUTPUT

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
High Level Supply Current	I_{CCH}	I_F = 0mA, V_{CC} = 5.5V		6	10	mA
Low Level Supply Current	I_{CCL}	I_F = 10mA, V_{CC} = 5.5V		8	13	mA
High Level Output Current	I_{OH}	I_F = 250µA V_{CC} = V_O = 5.5V		3	100	µA
Low Level Output Voltage	V_{OL}	I_F = 5mA, V_{CC} = 5.5V I_{OL} = 13mA		0.4	0.6	V

COUPLED

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Input Threshold Current	I_{TH}	V_{CC} = 5.5V, V_O = 0.6V I_{OL} ≥ 13mA		1.57	5	mA

SWITCHING

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Propagation Delay Time to High Output Level	t_{PLH}	R_L = 350Ω, C_L = 15pF			100	ns
		T_A = 25°C		45	75	
Propagation Delay Time to Low Output Level	t_{PHL}	R_L = 350Ω, C_L = 15pF			100	
		T_A = 25°C		25	75	
Pulse Width Distortion	$\|t_{PHL} - t_{PLH}\|$	R_L = 350Ω C_L = 15pF		10	35	
Propagation Delay Skew	t_{PSK}				40	
Output Rise Time (10% to 90%)	t_r			21		
Output Fall Time (90% to 10%)	t_f			7		

* Typical values at T_A = 25°C, V_{CC} = 5.0V

ELECTRICAL CHARACTERISTICS (T_A = −40 to 85°C unless otherwise specified)

SWITCHING

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Common Mode Transient Immunity at Logic High	CM_H	V_{CC} = 3.3V I_F = 0mA, R_L = 350Ω, V_{CM} = 1000Vp-p T_A = 25°C	10			kV/µs
		V_{CC} = 5V I_F = 0mA R_L = 350Ω V_{CM} = 1000Vp-p T_A = 25°C	10			
Common Mode Transient Immunity at Logic Low	CM_L	V_{CC} = 3.3V I_F = 10mA R_L = 350Ω V_{CM} = 1000Vp-p T_A = 25°C	10			
		V_{CC} = 5V I_F = 10mA R_L = 350Ω V_{CM} = 1000Vp-p T_A = 25°C	10			

ISOLATION

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Isolation Voltage	V_{ISO}	RH ≤ 50%, T_A = 25°C t = 1 min,	3750			V_{RMS}
Insulation Leakage Current	I_{I-O}	RH = 45%, T_A = 25°C V_{I-O} = 3kVDC, t = 5s			1.0	µA
Input-Output Resistance	R_{I-O}	V_{I-O} = 500VDC		10^{12}		Ω
Input-Output Capacitance	C_{I-O}	f = 1MHz, T_A = 25°C		1.0		pF

* Typical values at T_A = 25°C

ELECTRICAL CHARACTERISTICS

NOTES

- V_{CC} supply must be bypassed by a 0.1µF or larger capacitor and should be connected as close as possible to the package V_{CC} and GND pins.

- Peaking drive circuit may be used to speed up the LED. Peak driving current may go up to 50mA with maximum pulse width 50ns, provided average current does not exceed 20mA.

- t_{PLH} is measured from the 3.75 mA point on the falling edge of the input pulse to the 1.5 V point on the rising edge of the output pulse.

- t_{PHL} is measured from the 3.75 mA point on the rising edge of the input pulse to the 1.5 V point on the falling edge of the output pulse.

- t_r Rise time is measured from the 10% to the 90% levels on the LOW to HIGH transition of the output pulse.

- t_f Fall time is measured from the 90% to the 10% levels on the HIGH to LOW transition of the output pulse.

- CM_H is the maximum tolerable rate of rise of the common mode voltage to assure that the output will remain in a high logic state (i.e., $V_O > 2.0$ V).

- CM_L is the maximum tolerable rate of fall of the common mode voltage to assure that the output will remain in a low logic state (i.e., $V_O < 0.8$ V).

- Isolation Test with device considered a two terminal device : pins 1 and 3 shorted together, and pins 4, 5 and 6 shorted together.

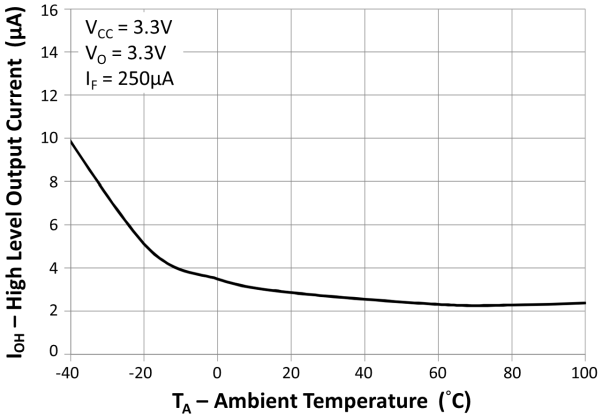


Fig 1 High Level Output Current at V_{CC} 3.3V vs Ambient Temperature

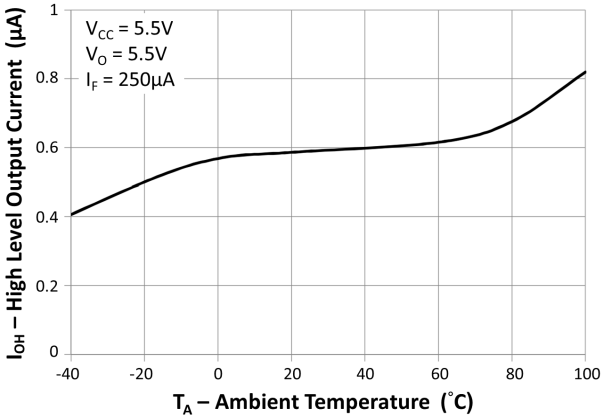


Fig 2 High Level Output Current at V_{CC} 5.5V vs Ambient Temperature

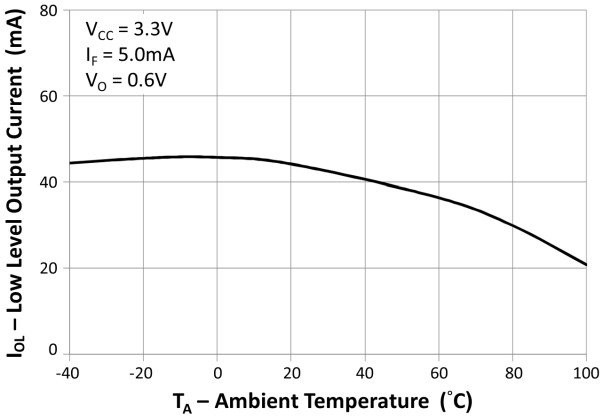


Fig 3 Low Level Output Current at V_{CC} 3.3V vs Ambient Temperature

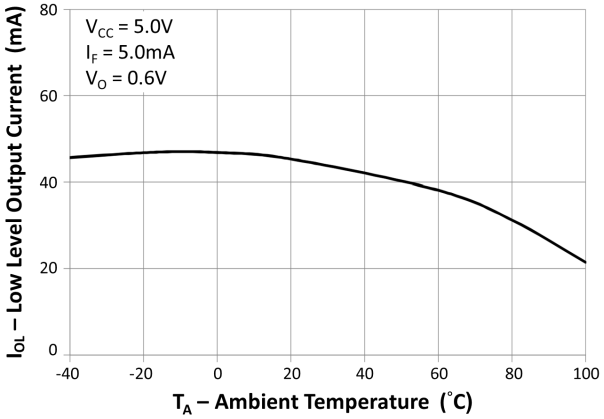


Fig 4 Low Level Output Current at V_{CC} 5.0V vs Ambient Temperature

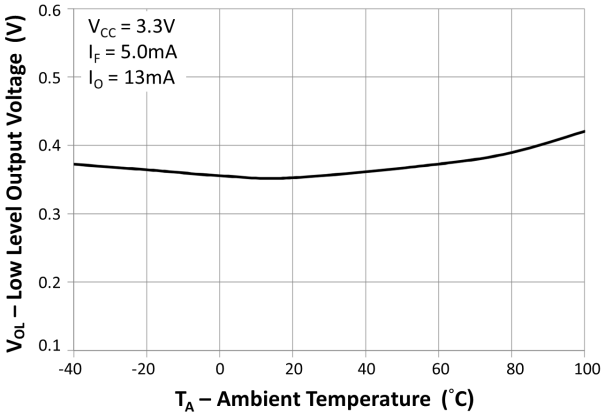


Fig 5 Low Level Output Voltage at V_{CC} 3.3V vs T_A

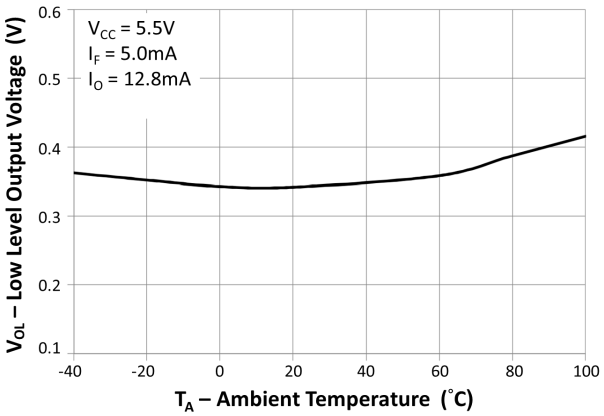


Fig 6 Low Level Output Voltage at V_{CC} 5.5V vs T_A

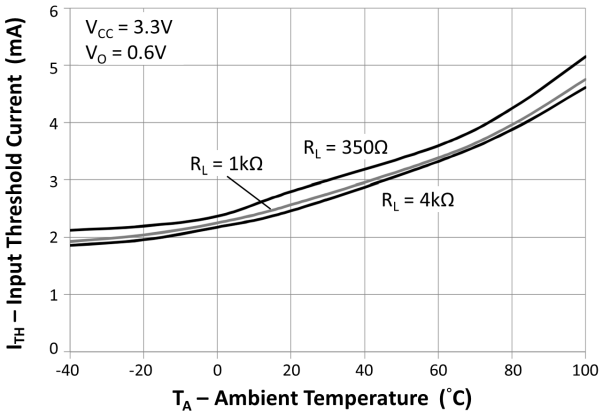


Fig 7 Input Threshold Current at V_{CC} 3.3V vs Ambient Temperature

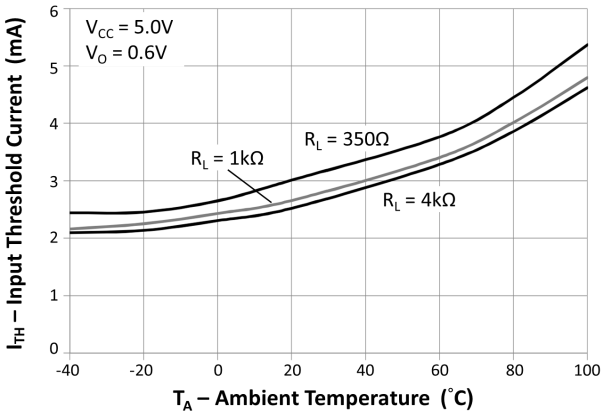


Fig 8 Input Threshold Current at V_{CC} 5.0V vs Ambient Temperature

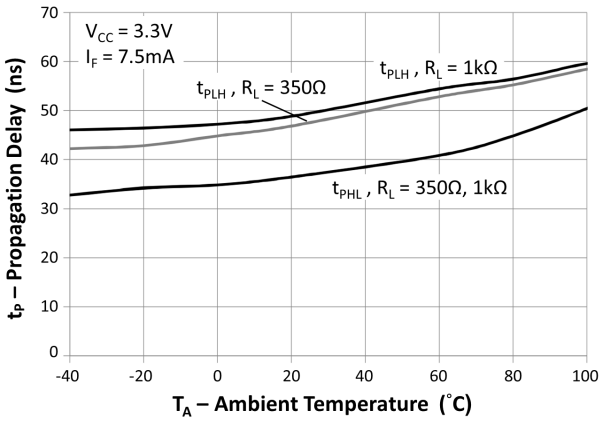


Fig 9 Propagation Delay at V_{CC} 3.3V vs Ambient Temperature

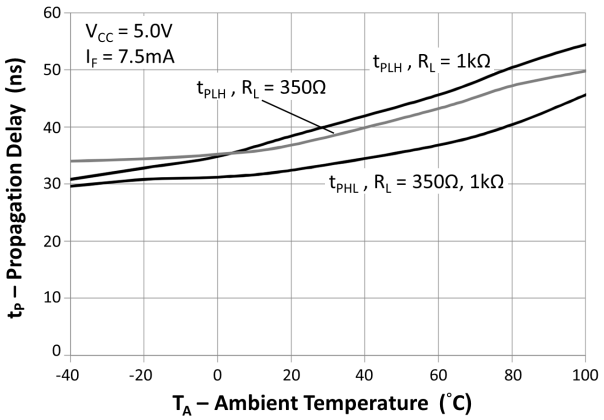


Fig 10 Propagation Delay at V_{CC} 5.0V vs Ambient Temperature

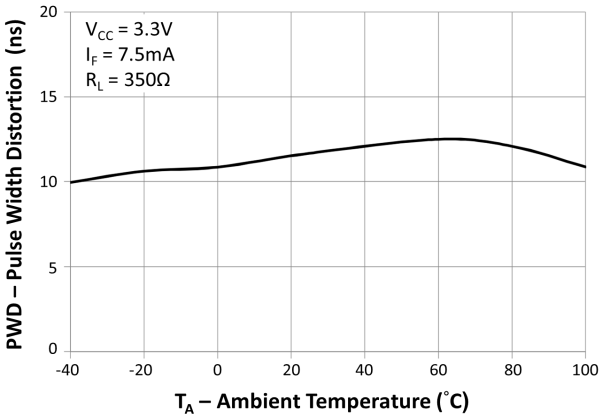


Fig 11 Pulse Width Distortion at V_{CC} 3.3V vs Ambient Temperature

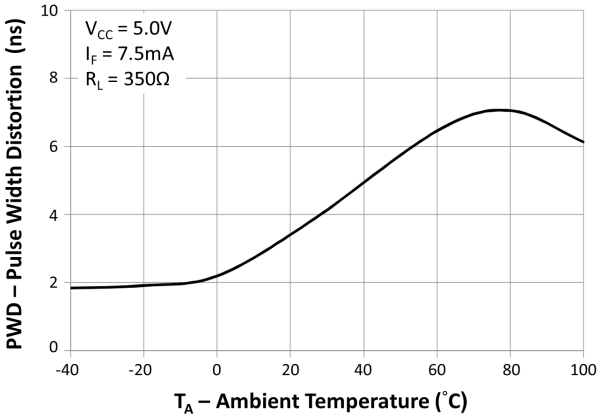


Fig 12 Pulse Width Distortion at V_{CC} 5.0V vs Ambient Temperature

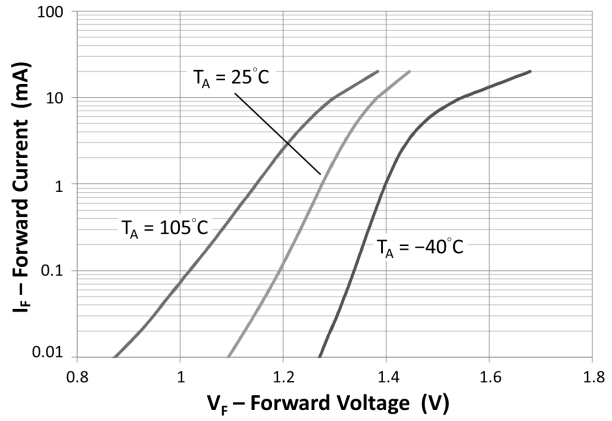
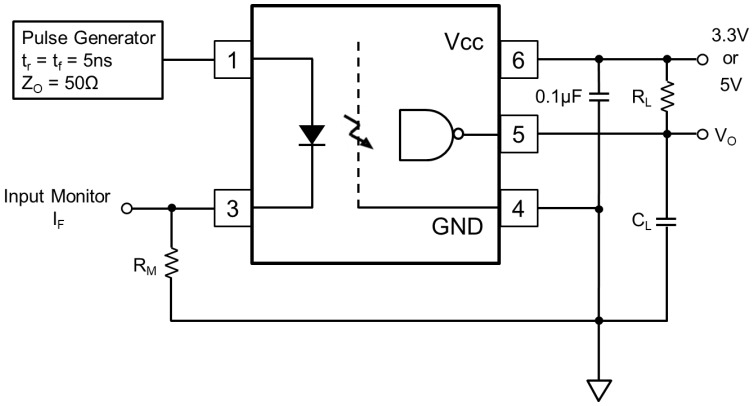
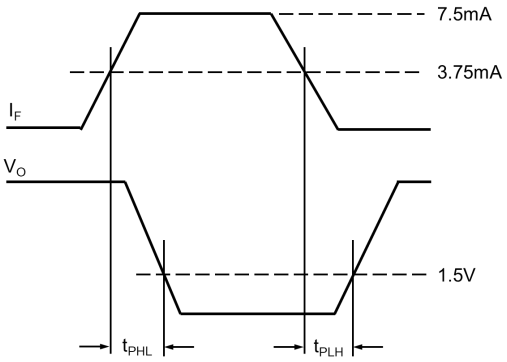
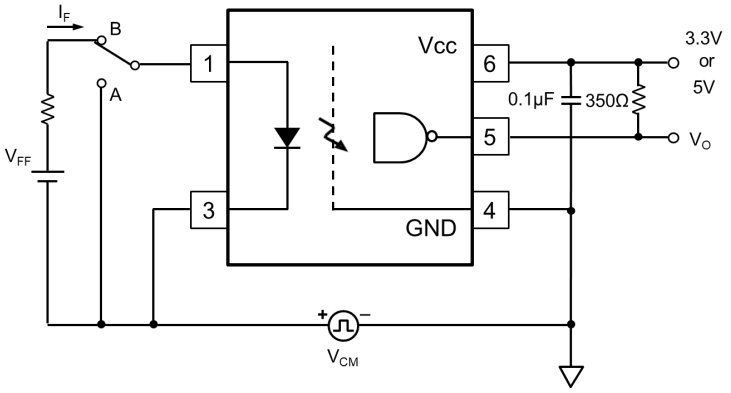


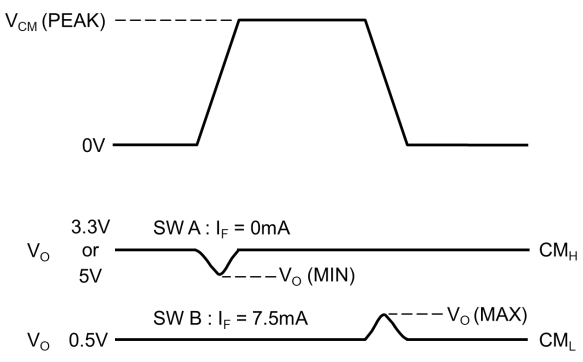
Fig 13 Forward Current vs Forward Voltage





Test Circuit for t_{PHL} and t_{PLH}



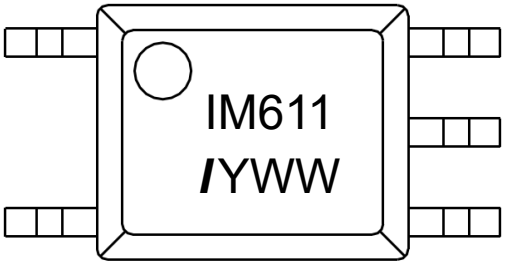


Test Circuit for Common Mode Transient Immunity

ORDER INFORMATION

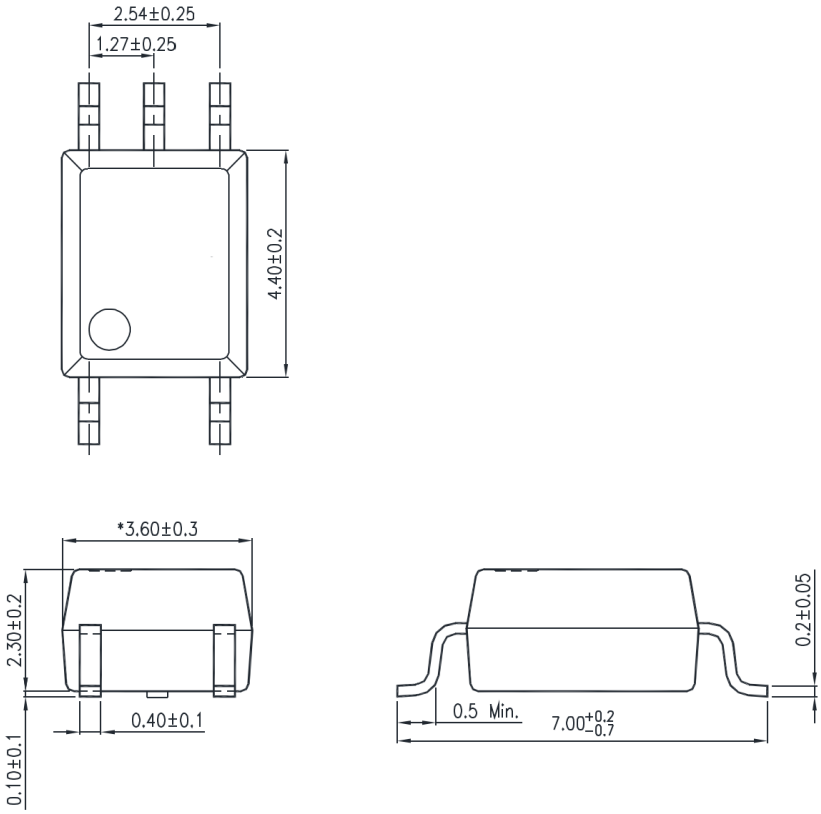
ICPLM611			
After PN	**PN**	**Description**	**Packing quantity**
None	ICPLM611	Surface Mount Tape and Reel	3000pcs per reel

DEVICE MARKING

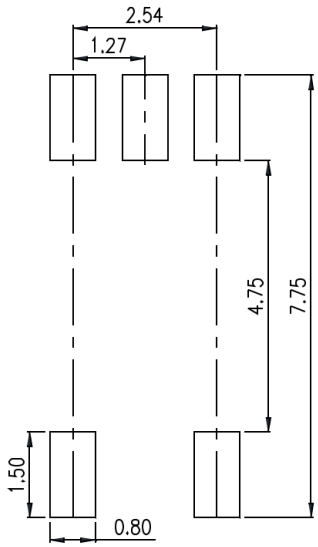


IM611	Device Part Number
/	Isocom
Y	1 digit Year code
WW	2 digits Week code

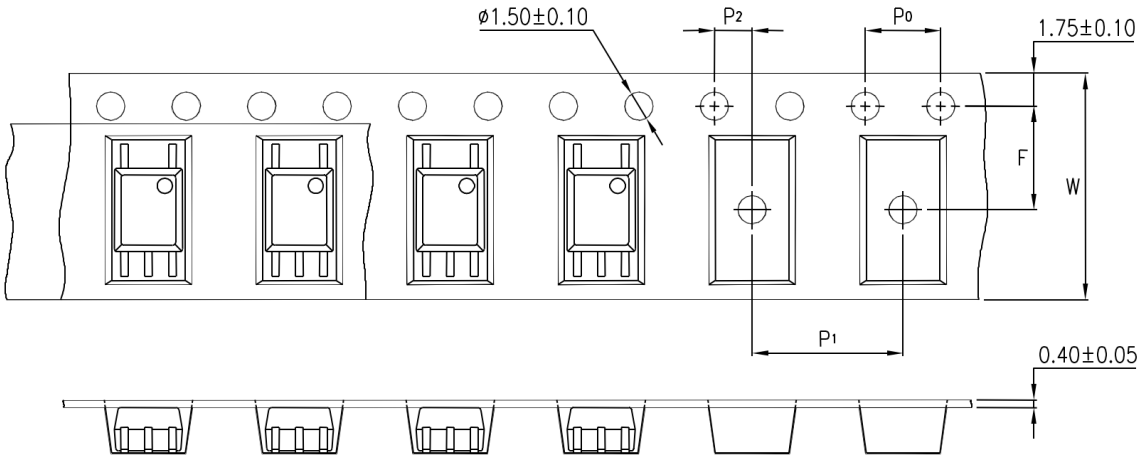
PACKAGE DIMENSIONS (mm)



RECOMMENDED PAD LAYOUT (mm)

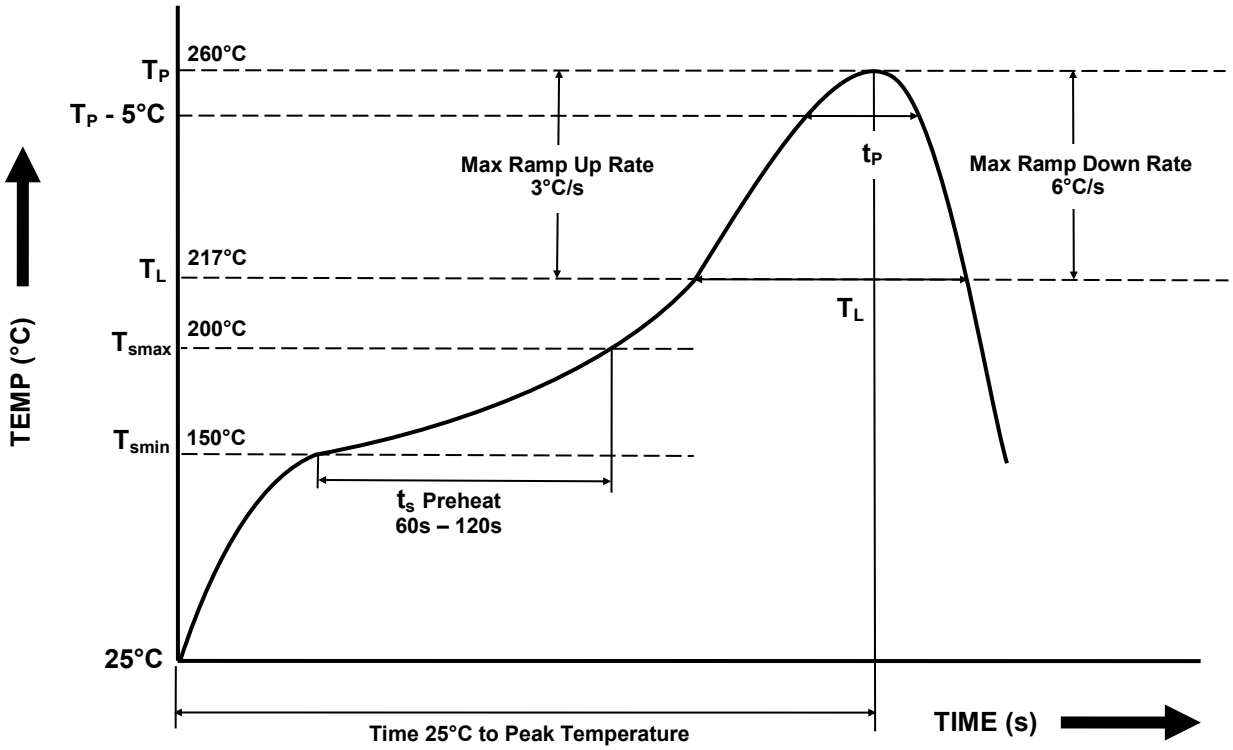


TAPE AND REEL PACKAGING



Description	Symbol	Dimension mm (inch)
Tape Width	W	12 ± 0.3 (0.472)
Pitch of Sprocket Holes	P_0	4 ± 0.1 (0.157)
Distance of Compartment to Sprocket Holes	F	5.5 ± 0.1 (0.217)
	P_2	2 ± 0.1 (0.079)
Distance of Compartment to Compartment	P_1	8 ± 0.1 (0.315)

IR REFLOW SOLDERING TEMPERATURE PROFILE
(One Time Reflow Soldering is Recommended)



Profile Details	Conditions
Preheat - Min Temperature (T_{SMIN}) - Max Temperature (T_{SMAX}) - Time T_{SMIN} to T_{SMAX} (t_s)	 150°C 200°C 60s - 120s
Soldering Zone - Peak Temperature (T_P) - Time at Peak Temperature - Liquidous Temperature (T_L) - Time within 5°C of Actual Peak Temperature (T_P – 5°C) - Time maintained above T_L (t_L) - Ramp Up Rate (T_L to T_P) - Ramp Down Rate (T_P to T_L)	 260°C 10s max 217°C 30s max 60s - 100s 3°C/s max 6°C/s max
Average Ramp Up Rate (T_{smax} to T_P)	3°C/s max
Time 25°C to Peak Temperature	8 minutes max

ISOCOM COMPONENTS

DISCLAIMER

Isocom Components is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing Isocom Components products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such Isocom Components products could cause loss of human life, bodily injury or damage to property.

In developing your designs, please ensure that Isocom Components products are used within specified operating ranges as set forth in the most recent Isocom Components products specifications.

The Isocom Components products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These Isocom Components products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury (“Unintended Usage”). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation Instruments, traffic signal instruments, combustion control instruments, medical Instruments, all types of safety devices, etc... Unintended Usage of Isocom Components products listed in this document shall be made at the customer’s own risk.

Gallium arsenide (GaAs) is a substance used in the products described in this document. GaAs dust and fumes are toxic. Do not break, cut or pulverize the product, or use chemicals to dissolve them. When disposing of the products, follow the appropriate regulations. Do not dispose of the products with other industrial waste or with domestic garbage.

The products described in this document are subject to the foreign exchange and foreign trade laws.

The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by Isocom Components for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of Isocom Components or others.